REMARKS

1. Submitted herewith are substitute drawings. The substitute drawings contain no new matter. Each such drawing has been labeled "REPLACEMENT SHEET" in accordance with 37 CFR §1.121(d).

2. Claims 1 through and 20 have been rejected under 35 U.S.C. §112, second paragraph. In each instance, the claims have been amended to clarify the meanings of the claims. Claim 20 has been cancelled, and new claims 21-39 are presented herewith to further define the invention.

   As amended herein, Claim 1 more particularly points out and distinctly claims the subject matter of applicants' invention. In particular, it is made clear that the invention permits a novel form of data communication among the processing elements of the message passing fabric, and that the route is established in accordance with a prioritization means. Claim 10, Claim 17 and Claim 18 have been amended for clarity. Claim 21 has been added to recite a physical function of performing computational operations and data communications. Claims 22-39 have been added in conjunction with newly submitted Claim 21. Each of the amendments has been made merely to make the claims distinct, and not to distinguish them from any prior art.

3. Claims 1-20 stand rejected under 35 USC §102(e) as anticipated by U.S. Patent 7,080,156, (hereafter "Lee"). Applicants respectfully traverse this rejection.

   Lee does not describe applicants' invention. In particular, the Lee patent differs from applicants' invention in the following ways:

   The Lee invention modifies messages as they pass through intermediate network nodes, whereas in the present invention, addressing means and message paths are separate from message ports, thus leaving messages unaltered as they are communicated across the mesh.

   Lee teaches the transmission of a message that must contain source, destination and region addresses, whereas in the present invention the message need not contain any of

these elements in order to be communicated along a routing path from source to destination.

Lee teaches only a unidirectional bus interconnecting nodes, whereas according to the present invention, control, address and data are forwarded to the next node, and control information flows backward to the source node over the same path segment.

Lee only teaches the routing of messages, whereas the present invention comprises a means of asynchronously establishing routes over which synchronous messages and control may be passed in both directions with no message modification.

Lee does not provide any means to try all possible optimal routes, whereas the present invention teaches a method of attempting each possible optimal segment by backing up from the last attempted but failed segment, and attempting a path through an untried alternate direction should one exist.

Lee does not teach a means by which an originating node is notified of a delivery failure or rejection by a destination node (because, for example of rights conflicts, or not ready status), whereas the present invention provides such control information.

Lee does not teach a means of detecting deadlock or collisions over either processing element or message path access, whereas the present invention detects and corrects for such occurrences by having contending processing elements independent of the other in the time domain in which each then retries messaging.

Lee cannot release a routing segment from a partially completed path, upon path obstruction, whereas the present invention teaches allowing each intermediate node to make an alternate path decision to facilitate exhaustively attempting all optimal paths to the destination, without source node intervention. Nor does Lee teach a means of recovering from an intermediate node that cannot forward a message due to congestion on all of its available outbound links, whereas the present invention does teach node congestion recovery.

Finally, Lee teaches a method in which the message must be queued at each intermediate point so that its content may be modified, whereas the present invention comprises a

method of constructing a route without manipulation or queuing of the message by intermediate nodes.

In sum, then, and for all of the forgoing reasons, the Lee reference fails to describe the invention disclosed and claimed by applicants here, and thus is inapposite as a reference under 35 U.S.C. 102(e).

Although merely made of record, and not relied upon, Applicants respond to the citation of Mukherjee, et al. as follows:

Mukherjee, et al. does not describe applicants' invention. In particular, the Mukherjee, et al. patent differs from applicants' invention in the following ways:

Mukherjee, et al. teaches a distributed multiprocessing computer system wherein message packets are queued at each network input port, whereas the present invention comprises a method of constructing a route without manipulation or queuing of the message by intermediate nodes. Message queuing results in an origin microprocessor unit having to wait until its message packet is queued by the network input port, then wait until the message moves to the top of the queue stack before it can be passed to its destination microprocessor unit. The acceptance of that destination microprocessor unit of the message packet then must be returned to the origin microprocessor unit via another queue. Until that return signal is delivered, the origin processor unit must wait before performing another task. The present invention, not being queued, does not suffer this limitation.

Mukherjee, et al. does not teach a means of detecting deadlock or collisions over either processing element or message path access, whereas the present invention detects and corrects for such occurrences by having contending processing elements independent of the other in the time domain in which each then retries messaging.

Mukherjee, et al. teaches only a unidirectional bus interconnecting nodes, whereas according to the present invention, control, address and data are forwarded to the next node, and control information flows backward to the source node over the same path segment.

Mukherjee, et al. only teaches the routing of message packets, whereas the present invention comprises a means of asynchronously establishing routes over which synchronous messages and control may be passed in both directions with no message modification. Asynchronously establishing the route means that the speed at which a route can be established is unaffected by any system clock and proceeds at the speed the technology permits. Mukherjee, et al. makes no mention of asynchronous operation and therefore synchronous operation is assumed when messages are loaded into the message queues.

Mukherjee, et al. does not provide any means to try all possible optimal routes, whereas the present invention teaches a method of attempting each possible optimal segment by backing up from the last attempted but failed segment, and attempting a path through an untried alternate direction should one exist.

The present invention teaches prioritization means and control means wherein an origin processing element wishing to write a message to a destination processing element needs only to initiate the write operation. The port associated with that origin processing element immediately takes over the task of assuring that the write operation is completed by the destination processing element being written. The origin processing element is immediately free to perform a next task as soon as the port associated with the origin processing element receives the information form the origin processing element. In like fashion, the destination processing element, once the message is delivered, is immediately free to perform another non-related operation. The destination processing element does not have to wait for a completion message to be sent back to the origin processing element. Mukherjee, et al. does not make any claim about similar functions.

Mukherjee, et al. teaches essentially a bus structured router with multiple arbiters (global and local) for message transfer from an origin processing element to a destination processing element, whereas the present invention describes message path segments that that are connected on-the-fly in order to construct an optimal path from the origin processing element to the destination processing element. If an optimal path segment is in use, exhaustive, iterative searching is done to produce the next-best path between the

origin processing element and the destination processing element, thus precluding multiple message queues.

Mukherjee, et al. makes no mention of message path segment reuse after a successful or unsuccessful origin processing element to destination processing element message transfer whereas this is a key to the performance of the present invention. In the present invention message path segments are connected on-the-fly in order to construct an optimal path from the origin processing element to the destination processing element. If an optimal path segment is in use, exhaustive, iterative searching is done to produce the next-best path between the origin processing element and the destination processing element. Once a successful message transfer has taken place, or if it is determined that the message is undeliverable, the message path is immediately broken down and the individual message path segments are all immediately available for use in other message path constructions.

Mukherjee, et al. cannot release a routing segment from a partially completed path, upon path obstruction, whereas the present invention teaches allowing each intermediate node to make an alternate path decision to facilitate exhaustively attempting all optimal paths to the destination, without source node intervention. Nor does Mukherjee, et al. teach a means of recovering from an intermediate node that cannot forward a message due to congestion on all of its available outbound links, whereas the present invention does teach node congestion recovery.

Mukherjee, et al. teaches message packet prioritization based on packet type whereas the present invention teaches message prioritization based on deterministic optimal routing paths.

Applicants respectfully request allowance of the claims, as amended herein.

Respectfully submitted,

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